2

Preparing to Install the Cisco Unified IP Phone on Your Network

Cisco Unified IP Phones enable you to communicate using voice over a data network. To provide this capability, the Cisco Unified IP Phones depend upon and interact with several other key Cisco Unified IP Telephony and network components.

This chapter focuses on the interactions between the Cisco Unified IP Phone 7960G and 7940G and Cisco Unified CallManager, DNS and DHCP servers, TFTP servers, and switches. It also describes options for powering phones. For related information about other major components in a Voice over IP (VoIP) network, refer to *Cisco IP Telephony Solution Reference Network Design (SRND) for Cisco Unified CallManager 4.0*, which is available at this URL:

http://www.cisco.com/go/srnd

For related information about voice and IP communications, refer to this URL:

http://www.cisco.com/en/US/partner/products/sw/voicesw/index.html

This chapter provides an overview of the interaction between the Cisco Unified IP Phone 7960G and 7940G and other key components of the Voice over IP (VoIP) network and includes these topics:

- Understanding Interactions with Other Cisco Unified IP Telephony Products, page 2-2
- Providing Power to the Cisco Unified IP Phone, page 2-4
- Understanding Phone Configuration Files, page 2-6

Understanding Interactions with Other Cisco Unified IP Telephony Products

To function in the IP telephony network, the Cisco Unified IP Phone must be connected to a networking device, such as a Cisco Catalyst switch. You must also register the Cisco Unified IP Phone with a Cisco Unified CallManager system before sending and receiving calls.

This section covers the following topics:

- Understanding How the Cisco Unified IP Phone Interacts with Cisco Unified CallManager, page 2-2

- Understanding How the Cisco Unified IP Phone Interacts with the VLAN, page 2-3

Understanding How the Cisco Unified IP Phone Interacts with Cisco Unified CallManager

Cisco Unified CallManager is an open and industry-standard call processing system. Cisco Unified CallManager software runs on a Windows 2000 server and sets up and tears down calls between phones, integrating traditional PBX functionality with the corporate IP network. Cisco Unified CallManager manages the components of the IP telephony system—the phones, the access gateways, and the resources necessary for such features as call conferencing and route planning. Cisco Unified CallManager also provides:

- Firmware for phones

- Authentication and encryption (if configured for the telephony system)

- Configuration file and CTL file, via TFTP service

- Phone registration
- Call preservation, so that a media session continues if signaling is lost between the primary CallManager and a phone)

For information about configuring Cisco Unified CallManager to work with the IP devices described in this chapter, refer to *Cisco Unified CallManager Administration Guide*, *Cisco Unified CallManager System Guide*, and to *Cisco Unified CallManager Security Guide.*

For an overview of security for the Cisco Unified IP Phone, see the "Understanding Security Features for Cisco Unified IP Phones" section on page 1-12.

Note   If the Cisco Unified IP Phone model that you want to configure does not appear in the Phone Type drop-down list in Cisco Unified CallManager Administration, go to the following URL and install the latest support patch for your version of Cisco Unified CallManager:
http://www.cisco.com/kobayashi/sw-center/sw-voice.shtml

Related Topic

- Telephony Features Available for the Phone, page 5-2

Understanding How the Cisco Unified IP Phone Interacts with the VLAN

The Cisco Unified IP Phone 7960G and 7940G have an internal Ethernet switch, enabling forwarding of packets to the phone, and to the access port and the network port on the back of the phone.

If a computer is connected to the access port, the computer and the phone share the same physical link to the switch and share the same port on the switch. This shared physical link has the following implications for the VLAN configuration on the network:

- The current VLANs might be configured on an IP subnet basis. However, additional IP address might not be available to assign the phone to the same subnet as other devices connect to the same port.

- Data traffic present on the data/native VLAN may reduce the quality of Voice-over-IP traffic.

- Network security may indicate a need to isolate the VLAN voice traffic from the VLAN data traffic.

You can resolve these issues by isolating the voice traffic onto a separate VLAN. The switch port that the phone is connected to would be configured to have separate VLANs for carrying:

- Voice traffic to and from the IP phone (auxiliary VLAN, on the Cisco Catalyst 6000 series, for example)

- Data traffic to and from the PC connected to the switch through the access port of the IP phone (native VLAN)

Isolating the phones on a separate, auxiliary VLAN improves the quality of the voice traffic and allows a large number of phones to be added to an existing network where there are not enough IP addresses for each phone.

For more information, refer to the documentation included with a Cisco switch. You can also access related documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/product/lan/index.htm

Related Topics

Providing Power to the Cisco Unified IP Phone

You can power a Cisco Unified IP Phone from an external power supply, from a switch port, or from a power source between the phone and the switch.

The Cisco Unified IP Phone can be powered by the following sources:

- External power source—Optional Cisco AC adapter and power cord for connecting to a standard wall receptacle.

- WS-X6348-RJ45V 10/100 switching module—Inline power provider to the Cisco Unified IP Phone when connected to a Catalyst 6000 family 10/100BaseTX switching module.

This module sends power on pins 1 & 2 and 3 & 6, which are also used to transmit Ethernet signals. Before the switch sends power, it tests for the presence of a Cisco Unified IP Phone, avoiding damage to other Ethernet devices.

> **Note**   Only the network port supports inline power from the Cisco Catalyst switches.

- WS-PWR-PANEL—Power patch panel that allows the Cisco Unified IP Phone to be connected to existing Catalyst 4000, 5000, and 6000 family 10/100BaseTX switching modules.

  This module sends power on pins 4, 5, 7, & 8, which are not used for Ethernet signaling. Like the inline power, the power patch panel also attempts to verify that the attached device is a Cisco Unified IP Phone before providing power.

Related Topics

Power Outage

Your accessibility to emergency service through the phone is dependent on the phone being powered. If there is an interruption in the power supply, Service and Emergency Calling Service dialing will not function until power is restored. In the case of a power failure or disruption, you may need to reset or reconfigure equipment before using the Service or Emergency Calling Service dialing.

Related Topics

Understanding Phone Configuration Files

Configuration files for a phone are stored on the TFTP server and define parameters for connecting to Cisco Unified CallManager. In general, any time you make a change in Cisco Unified CallManager that requires the phone to be reset, a change is made to the phone's configuration file automatically.

Configuration files also contain information about which image load the phone should be running. If this image load differs from the one currently loaded on a phone, the phone contacts the TFTP server to request the new image file.

In addition, if the device security mode in the configuration file is set to Authenticated, the phone contains a valid LSC, and the CTL file on the phone has a valid certificate for Cisco Unified CallManager, the phone establishes a TLS connection to Cisco Unified CallManager. Otherwise, the phone establishes a TCP connection.

Note   If the device security mode in the configuration file is set to Authenticated or Encrypted but the phone does not contain a valid LSC or the CTL file on the phone does not have a valid certificate for Cisco Unified CallManager, the phone will continuously try to obtain a CTL file or try to install a valid certificate so that it can register securely.

A phone requests a configuration file whenever it resets and registers with Cisco Unified CallManager.

Note   If a phone receives a CTL file with a valid certificate for the TFTP server, the phone requests a signed.cnf.xml.sgn configuration file instead the .cnf.xml file.

A phone accesses a default configuration file named XmlDefault.cnf.xml from the TFTP server when the following conditions exist:

- You have enabled auto-registration in Cisco Unified CallManager
- The phone has not been added to the Cisco Unified CallManager Database
- The phone is registering for the first time
- The phone encounters an error while attempting to retrieve its configuration file from the TFTP server

All other times, a phone accesses a .cnf.xml file corresponding to its device name.

Understanding the Phone Startup Process

When connecting to the VoIP network, the Cisco Unified IP Phone goes through a standard startup process that is composed of several steps, as described in Table 2-1. Depending on your specific network configuration, not all of these steps may occur on your Cisco Unified IP Phone.

Table 2-1   *Cisco Unified IP Phone Startup Process (continued)*

Step	Description	Related Topics
1. Obtaining Power from the Switch.	You can connect the Cisco Unified IP Phone to a Cisco Catalyst switch with one of the modules that provides power to the phone (WS-X6348-RJ45V). If you use this optional configuration, the phone receives phantom power and powers up when you connect the Cisco Unified IP Phone to the switch. The phone then sends Cisco Discovery Protocol (CDP) notifications to the switch indicating that it is ready to receive CDP packets and indicating the power requirement for the phone. The switch allocates power and sends it over the network cable.	• Providing Power to the Cisco Unified IP Phone, page 2-4. • Resolving Startup Problems, page 8-2.
2. Loading the Stored Phone Image.	The Cisco Unified IP Phone has non-volatile Flash memory in which it stores firmware images and user-defined preferences. At startup, the phone runs a bootstrap loader that loads a phone image stored in Flash memory. Using this image, the phone initializes its software and hardware.	Resolving Startup Problems, page 8-2.
3. Configuring VLAN.	If the Cisco Unified IP Phone is connected to a Cisco Catalyst switch, the switch next informs the phone of the voice VLAN defined on the switch. The phone needs to know its VLAN membership before it can proceed with the Dynamic Host Configuration Protocol (DHCP) request for an IP address.	• Network Configuration Menu Options, page 4-3. • Resolving Startup Problems, page 8-2.

Table 2-1   Cisco Unified IP Phone Startup Process (continued)

Step	Description	Related Topics
4. Obtaining an IP Address.	If the Cisco Unified IP Phone is using DHCP to obtain an IP address, the phone queries the DHCP server to obtain one. If you are not using DHCP in your network, you must assign static IP addresses to each phone locally.	• Network Configuration Menu Options, page 4-3. • Resolving Startup Problems, page 8-2.
5. Accessing a TFTP Server.	In addition to assigning an IP address, the DHCP server directs the Cisco Unified IP Phone to a TFTP Server. If the phone has a statically-defined IP address, you must configure the TFTP server locally on the phone; the phone then contacts the TFTP server directly.	• Network Configuration Menu Options, page 4-3 • Resolving Startup Problems, page 8-2.
6. Requesting the CTL file.	Before requesting a configuration file, a phone accesses a CTL file. If you want a phone to use security features, the CTL file should be available. For information about creating the CTL file, refer to *Cisco Unified CallManager Security Guide*.	• Configuring Security on the Cisco Unified IP Phone, page 3-16

Table 2-1   Cisco Unified IP Phone Startup Process (continued)

Step	Description	Related Topics
7. Requesting the Configuration File.	The TFTP server has configuration files, which define parameters for connecting to Cisco Unified CallManager and other information for the phone.	• "Understanding Phone Configuration Files" section on page 2-6 • Configuring Security on the Cisco Unified IP Phone, page 3-16 • Resolving Startup Problems, page 8-2.
8. Contacting Cisco Unified CallManager.	The configuration file defines how the Cisco Unified IP Phone communicates with Cisco Unified CallManager. After obtaining the file from the TFTP server, the phone attempts to make a connection to the highest priority Cisco Unified CallManager on the list. If security is implemented, the phone makes a TLS connection. Otherwise, it makes a non-secure TCP connection. If the phone was manually added to the database, Cisco Unified CallManager identifies the phone. If the phone was not manually added to the database and auto-registration is enabled in Cisco Unified CallManager, the phone attempts to auto-register itself in the Cisco Unified CallManager database. **Note** Auto-registration must be disabled if security is implemented. Cisco Unified CallManager informs devices using .cnf format configuration files of their load ID. Devices using .xml format configuration files receive the load ID in the configuration file.	Resolving Startup Problems, page 8-2.

Methods for Adding Phones to the Cisco Unified CallManager Database

Before installing the Cisco Unified IP phone, you must choose a method for adding phones to the Cisco Unified CallManager database. These sections describe the methods:

- Adding Phones with Auto-Registration, page 2-11
- Adding Phones with Auto-Registration and TAPS, page 2-12
- Adding Phones with Cisco Unified CallManager Administration, page 2-13
- Adding Phones with BAT, page 2-14

Table 2-2 provides an overview of these methods for adding phones to the Cisco Unified CallManager database.

Table 2-2   Methods for Adding Phones to the Cisco Unified CallManager Database

Method	Requires MAC Address?	Notes
Auto-registration	No	Provides no control over directory number assignment to phone. Not available when security or encryption is enabled.
Auto-registration with TAPS	No	Requires auto-registration and the Bulk Administration Tool (BAT); updates the Cisco Unified CallManager database with the MAC address and DNs for the device when user calls TAPS from the phone.

Table 2-2   Methods for Adding Phones to the Cisco Unified CallManager Database

Method	Requires MAC Address?	Notes
Using the Cisco Unified Call Manager Administration	Yes	Must add phones individually.
Using BAT	Yes	Can add groups of same model of phone. Can schedule when phones are added to the Cisco Unified CallManager database.

Adding Phones with Auto-Registration

By enabling auto-registration before you begin installing phones, you can:

- Automatically add a Cisco Unified IP Phone to the Cisco Unified CallManager database when you physically connect the phone to your IP telephony network. During auto-registration, Cisco Unified CallManager assigns the next available sequential directory number to the phone.

- Add phones without first gathering MAC addresses from the phones.

- Quickly enter phones into the Cisco Unified CallManager database and modify any settings, such as the directory numbers, from Cisco Unified CallManager.

- Move auto-registered phones to new locations and assign them to different device pools without affecting their directory numbers.

Note   You should use auto-registration to add less than 100 phones to your network. To add more than 100 phones to your network, use the Bulk Administration Tool (BAT). See the "Adding Phones with BAT" section on page 2-14.

In some cases, you might not want to use auto-registration: for example, if you want to assign a specific directory number to the phone or if you plan to implement authentication or encryption, as described in *Cisco Unified CallManager Security Guide*. For information about enabling auto-registration, refer to "Enabling Auto-Registration" in the *Cisco Unified CallManager Administration Guide.*

Note Cisco Unified CallManager automatically disables auto-registration if you configure the cluster-wide security mode for authentication and encryption through the Cisco CTL client.

Related Topics

- Adding Phones with Auto-Registration and TAPS, page 2-12
- Adding Phones with Cisco Unified CallManager Administration, page 2-13
- Adding Phones with BAT, page 2-14

Adding Phones with Auto-Registration and TAPS

TAPS, the Tool for Auto-Registered Phones Support, works with the Bulk Administration Tool (BAT) to update a batch of phones that were already added to the Cisco Unified CallManager database with dummy MAC addresses. You use TAPS to update MAC addresses and download pre-defined configurations for phones.

You can add phones with auto-registration and TAPS without first gathering MAC addresses from phones.

Note You should use auto-registration and TAPS to add less than 100 phones to your network. To add more than 100 phones to your network, use the Bulk Administration Tool (BAT). See the "Adding Phones with BAT" section on page 2-14.

To implement TAPS, you or the end-user dial a TAPS directory number and follow voice prompts. When the process is complete, the phone will have downloaded its directory number and other settings, and the phone will be updated in Cisco Unified CallManager Administration with the correct MAC address.

Auto-registration must be enabled in Cisco Unified CallManager Administration (**System > Cisco Unified CallManager**) for TAPS to function.

Note   Cisco Unified CallManager automatically disables auto-registration if you configure the cluster-wide security mode for authentication and encryption through the Cisco CTL client.

Refer to *Bulk Administration Tool User Guide for Cisco Unified CallManager* for detailed instructions about BAT and about TAPS.

Related Topics

- Adding Phones with Auto-Registration, page 2-11
- Adding Phones with Cisco Unified CallManager Administration, page 2-13
- Adding Phones with BAT, page 2-14

Adding Phones with Cisco Unified CallManager Administration

You can add phones individually to the Cisco Unified CallManager database using Cisco Unified CallManager Administration. To do so, you first need to obtain the MAC address for each phone.

For information about determining a MAC address, see the "Determining the MAC Address of a Cisco Unified IP Phone" section on page 2-14.

After you have collected MAC addresses, choose **Device > Add a New Device** in Cisco Unified CallManager Administration to begin.

For complete instructions and conceptual information about Cisco Unified CallManager, refer to *Cisco Unified CallManager Administration Guide* and to *Cisco Unified CallManager System Guide*.

Related Topics

- Adding Phones with Auto-Registration, page 2-11
- Adding Phones with Auto-Registration and TAPS, page 2-12
- Adding Phones with BAT, page 2-14

Adding Phones with BAT

The Cisco Bulk Administration Tool (BAT) is a plug-in application for Cisco Unified CallManager that enables you to perform batch operations, including registration, on multiple phones.

Before you can add phones using BAT only (not in conjunction with TAPS), you must obtain the MAC address for each phone.

For information about determining a MAC address, see the "Determining the MAC Address of a Cisco Unified IP Phone" section on page 2-14.

For detailed instructions about using BAT, refer to *Cisco Unified CallManager Administration Guide* and to *Bulk Administration Tool User Guide for Cisco Unified CallManager.*

Related Topics

- Adding Phones with Auto-Registration, page 2-11
- Adding Phones with Auto-Registration and TAPS, page 2-12
- Adding Phones with Cisco Unified CallManager Administration, page 2-13

Determining the MAC Address of a Cisco Unified IP Phone

You can determine the MAC address for a phone in any of these ways:

- From the phone, choose **Settings > Model Information** and look at the MAC Address field.
- Look at the MAC label on the back of the phone.
- Display the web page for the phone and click the **Device Information** hyperlink.

  For information about accessing the web page, see the "Accessing the Web Page for a Phone" section on page 7-2.